

FORM PTO-1390
(REV. 5-93)U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICEATTORNEY'S DOCKET NUMBER
1123/29TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/582278

INTERNATIONAL APPLICATION NO.
PCT/GB98/03520INTERNATIONAL FILING DATE
(25.11.98)
25 November 1998PRIORITY DATE CLAIMED
(23.12.97)
23 December 1997TITLE OF INVENTION
CAMERA MOUNTINGS FOR TV/VIDEO CAMERASAPPLICANT(S) FOR DO/EO/US
LINDSAY, Richard Arthur

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) immediately rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☐ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information: International Search Report, Preliminary Examination Report.

EXPRESS NO. EL 30269964545

U.S. APPLICATION NO. if known, see 37 C.F.R.1.5 <div style="font-size: 24pt; font-weight: bold; margin-top: 5px;">09/582278</div>	INTERNATIONAL APPLICATION NO. PCT/GB98/03520	ATTORNEY'S DOCKET NUMBER 1123/29
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17. ☐ The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)-(5)):

Search Report has been prepared by the EPO or JPO \$840.00

International preliminary examination fee paid to USPTO (37 CFR 1.482) \$670.00

No international preliminary examination fee paid to USPTO (37 CFR 1.482) but
international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$760.00

Neither international preliminary examination fee (37 CFR 1.482) nor international
search fee (37 CFR 1.445(a)(2)) paid to USPTO \$970.00

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all
claims satisfied provisions of PCT Article 33(2)-(4) \$96.00

CALCULATIONS | PTO USE ONLY

ENTER APPROPRIATE BASIC FEE AMOUNT = \$840.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 CFR 1.492(e)). \$

Claims	Number Filed	Number Extra	Rate	
Total Claims	8 - 20 =		X \$18.00	\$
Independent Claims	1 - 3 =		X \$78.00	\$
Multiple dependent claim(s) (if applicable)			+ \$270.00	\$
TOTAL OF ABOVE CALCULATIONS =				\$840.00

Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must
also be filed. (Note 37 CFR 1.9, 1.27, 1.28). \$

SUBTOTAL = \$840.00

Processing fee of \$130.00 for furnishing the English translation later the ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(f)). + \$

TOTAL NATIONAL FEE = \$840.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property + \$

TOTAL FEES ENCLOSED = \$840.00

	Amount to be:	
	refunded	\$
	charged	\$

a. ☐ A check in the amount of \$_____ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. 11-0600 in the amount of \$840.00 to cover the above fees. A duplicate copy of this
sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit
Account No. 11-0600. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be
filed and granted to restore the application to pending status.

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25,054

REGISTRATION NUMBER

June 23, 2000

DATE

09/582278

EXPRESS MAIL CERTIFICATE

"EXPRESS MAIL" MAILING LABEL NUMBER EL3626996454S

DATE OF DEPOSIT 6/23/00

TYPE OF DOCUMENT National Phase Application

SERIAL NO. to be Assigned FILING DATE to be assigned

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE, BY BEING HANDED TO A POSTAL CLERK OR BY BEING PLACED IN THE EXPRESS MAIL BOX BEFORE THE POSTED DATE OF THE LAST PICK UP, AND IS ADDRESSED TO THE ASSISTANT COMMISSIONER FOR PATENTS, WASHINGTON, D.C. 20231.

BORIS POLANCO

(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

(SIGNATURE OF PERSON MAILING PAPER OR FEE)

Camera Mounting For TV/Video Camera

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CAMERA MOUNTINGS FOR TV/VIDEO CAMERAS

5 This invention relates to camera mountings for TV/video cameras and is particularly although not exclusively applicable to the camera mountings of our European Patent Publication No. 0725758 and our UK Patent Publication No. 2163720.

10 WO/A-94/12424 discloses a counterbalanced load carrier comprising a multi-stage telescopic arm. One stage adjacent one end of the arm is mounted for rotation by a vertical axis on a mobile base. The adjacent end stage of the arm carries a counterweight and the end stage at the other end of the arm carries
15 a support for a TV or video camera. The respective stages of the arm are interconnected by a cable or like mechanism to extend and retract together maintaining a fixed ratio between the radius of the payload support and the horizontal axis and the
20 counterweight and the horizontal axis so that the arm remains counterbalanced throughout its range of extension and retraction. The cable mechanism also acts on the camera support on said end section of the arm to maintain the support horizontal throughout the
25 range of tilting of the arm. An additional counterbalancing force can be applied at control point on end stage, the control point being constrained to move in a vertical guideway located on a horizontal moveable carriage to follow the vertical/horizontal
30 movement of the end stage of the arm.

FR-A-2264298 discloses a camera mounting for movement of a camera in third orthogonal axes by steered wheels of a carriage, a pivot arm about a
35 horizontal axis and a camera platform which pivots about a vertical and a horizontal axis. Each movement is monitored by a separate sensor to determine, with

the aid of a computer, the position of the camera with respect to a reference point.

5 This invention provides a camera mounting for a
TV-video camera, comprising a base, a counter-balanced
arm assembly pivotally mounted on the base at one end
thereof to swivel about a vertical axis and having a
platform for carrying a camera at the other end
thereof, the arm assembly having relatively movable
10 components to permit, with said swivelling of the
assembly about said vertical axis, movement of the
platform in three orthogonal axes; wherein the base of
the mounting has a datum point, the mounting has three
separate transducer means for determining swivel
15 movement of the arm about said vertical axis and
relative movement between said arm components in a
plane containing said vertical axis, and monitoring
means are provided for determining, from the movements
detected by said transducers, the position of the
20 camera platform with respect to the datum point in
said three axes to provide information regarding the
location of the camera for purposes such as
controlling movement of a virtual reality image to be
combined with a real image as seen by the camera as
25 the camera is moved with respect to the datum.

More specifically, the arm assembly is mounted
on the base for rotation about a vertical axis through
the datum point, the arm assembly providing movement
30 of the camera platform in two orthogonal axes in any
plane containing said vertical axis, and said
transducer means comprising first means for
determining rotation of the arm about said vertical
axis and further means for determining movement of the
35 camera mounting in said plane with respect to the
datum point.

In one arrangement according to the invention

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the arm assembly may be telescopic and may be mounted on the base to pivot in a vertical plane about a horizontal axis.

5 In an alternative construction according to the invention, the arm assembly may comprise a first arm pivotally mounted on the base about a horizontal axis and a second arm pivotally mounted on the first arm about a parallel horizontal axis for supporting the
10 camera platform.

 In any of the above arrangements, the arm assembly may have a control point connected to the arm assembly so that movement of the control point with
15 respect to the datum point in the vertical plane containing the arm and said vertical axis is directly proportional to the movement of the camera platform and said further transducer means is arranged to monitor movement of the control point with respect to
20 the datum point.

 More specifically, the transducer means for monitoring movement of the control point may comprise separate transducers for responding to movement of the
25 control point with respect to the datum point in vertical and horizontal directions.

 In the case where the arm assembly is telescopically extendable and pivotable about a
30 horizontal axis, the transducer means may be arranged to monitor extension of the arm and pivotal movement of the arm about said horizontal axis to monitor the position of the camera platform in a vertical plane with respect to said datum.

35 In the case where the arm assembly has first and second pivoted arms, said further transducer means may

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be arranged to monitor pivotal movement of the first arm about said horizontal axis with respect to the base and pivotal movement of the second arm with respect to the first arm to monitor the position of the camera platform with respect to said datum.

The following is a description of some specific embodiments of the invention, reference being made to the accompanying drawings in which:

Figure 1 is a diagrammatic view of a camera mounting for a TV/video camera embodying a telescopic arm mounting and one arrangement of transducers for determining movement of the camera platform;

Figure 2 is a view of a similar camera mounting embodying a telescopic arm mounting with an alternative arrangement of transducers for determining movement of the camera platform;

Figure 3 is a diagrammatic view of a camera mounting having a pantograph arm assembly and arrangement of transducers for determining movement of the camera platform; and

Figure 4 is a similar view to Figure 3 showing a further arrangement of transducers for determining the movement of the camera platform.

Referring firstly to Figure 1 of the drawings, there is shown a camera mounting for a television or video camera. A detailed description of the arm is set out in our European Patent Publication No. 0725758 to which reference should be made. Briefly the mounting comprises a counter-balanced telescopic arm indicated generally at 10, mounted on a base indicated generally at 11. An upwardly extending bifurcated column 12 is mounted for rotation on the base about a vertically extending axis A-B. The bifurcated column has spaced arms 13 having inwardly extending trunnions 14

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at their upper ends to receive and support the arm 10 for tilting about a horizontal axis indicated at C.

The telescopic arm comprises six elements or stages 15 to 20 which are slidably engaged one within the other to move between the extended position shown in Figure 1 and a retracted position which is not shown. A mechanism interlinks the successive stages of the arm so that when the arm is extended all the stages extend by the same amounts with respect to each other and when contracted, contract by the same amounts with respect to each other. The arm is pivotally mounted on the trunnion 14 on the intermediate element 16 next to end element 15 for rotation of the arm about the horizontal axis C defined by the trunnions.

The outer end stage 20 of the arm carries a platform 21 to receive and support a TV or video camera in a mounting which provides usual pan and tilt movements. The other end stage 15 of the arm contains a fixed weight (not shown) intended to balance the arm whether in extended or "telescoped" mode. The mounting thus permits manual (or "motorised") movement of the platform (and thereby the camera) in three axes with respect to an origin or datum point on the base and also normal pan and tilt movement of the camera on the platform 21.

The column 12 has a horizontally extending platform 30 located to one side of the column and disposed below the inner end stage 15 of the arm. A guideway 31 is mounted on the platform and a wheeled carriage 32 is constrained to run on the guideway to support the carriage for horizontal movement along the guideway. The carriage is formed with a vertically

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extending slot 33 in which a pin 34 on the inner end stage 15 of the arm is constrained to slide so that as the arm tilts about the horizontal axis C, the pin will slide up and down the slot and at the same time the carriage 32 will move along the guideway. Rams may be provided for moving the carriage along the guideway and for moving the pin vertically up and down the slot to provide "motorised" movement of the camera in the two axes of movement, that is parallel to axis A-B and towards and away from axis A-B.

To determine the movement and thereby the position of the camera platform with respect to the origin or datum of the axis A-B at the base of the camera mounting, one linear transducer 35 is mounted on the platform 30 and is coupled to the carriage 32 to determine horizontal movement of the carriage, a second linear transducer 36 is mounted vertically on the carriage to determine movement of the pin and a third transducer 37 is mounted on the base to determine rotation of the pedestal about the vertical axis A-B with respect to the base.

The pin on the arm provides a control point, movement of which in the horizontal and vertical directions will be proportional to the corresponding movements of the camera platform in horizontal and vertical directions. The constant of proportionality will be the number of moving stages "N" of the arm between the axis C and the platform 30.

Let m = the horizontal co-ordinate of the control point in the plane of the arm;

n = the vertical co-ordinate of the control point in the plane of the arm; and

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θ = the angle of rotation of the arm about the vertical axis A-B.

Then the co-ordinates of the camera platform
5 position relative to an origin on the vertical axis A-B will be as follows :

$N.m.\cos.\theta$; $N.m.\sin \theta$; $N.n$.

10 The information relating to the camera platform position may be fed to monitoring equipment which merges a virtual reality background with a foreground as seen by the camera. Transducers are also provided on the camera pan and tilt mechanisms for determining
15 pan and tilt movement of the camera. The virtual reality background image is moved in accordance with movement of the camera mounting and the camera pan and tilt mechanisms as the camera is moved in viewing the foreground so that the virtual reality background
20 moves appropriately with the foreground.

Figure 2 shows an alternative arrangement in which one rotary transducer 38 measures the angle α of the arm 10 to the horizontal and a second, linear
25 transducer 39 measures the extension of one section of the arm with respect to another. This extension is proportional to the extension of the entire telescopic arm, the constant of proportionality being the number of stages of the arm between the axis C and the
30 platform 30. The extension together with the angle α provides a set of co-ordinates for the camera position in a plane containing the arm and axis A-B. A third rotary transducer is placed on the axis A-B for measuring θ , the angle of orientation of the arm about
35 the vertical axis.

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The co-ordinates of the camera platform position are then defined as follows :

$$\begin{aligned} & (Nx+y) \cos \alpha \cos \theta; \\ 5 \quad & (Nx+y) \cos \alpha \sin \theta; \\ & (Nx+y) \sin \alpha. \end{aligned}$$

Figures 3 and 4 show an application of the invention to the balanced camera mounting embodying a pantographic arm as described and illustrated in our UK Patent Publication No. 2163720. The camera mounting comprises a base 50 mounted for rotation about a vertical axis indicated at A-B. A counter-balanced pantographic mechanism 51 is mounted on the base comprising an upwardly extending first parallelogram linkage 52 pivotally mounted about horizontal axes on the base and a second parallelogram linkage 53 connected by a common link 54 to the upper end of the first linkage at one end and having a camera support platform 55 at its other end. A counter-balancing mechanism indicated at 56 is connected to the parallelogram linkages and has a control point P constrained to move horizontally and vertically in proportion to the movement of the platform 55. Transducers determine the horizontal and vertical extent of movement of the control point P in a similar manner to the arrangement of Figure 1.

Movement of the control point P in the horizontal and vertical directions is proportional to the movement in the directions in the plane of the arm of the camera platform. The constant of proportionality "k" is related to the length of the sections of the linkages of the arm.

35

Two linear transducers measure the horizontal and

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vertical or cartesian co-ordinates "m" and "n" of the point P relative to an origin on vertical axis A-B. A third rotary transducer is placed on axis A-B to measure θ , the angle of orientation of the arm about the vertical axis. The co-ordinates of the camera position are then as follows :

K.m.cos θ ;
 K.m.sin θ ;
 K.n.

Figure 4 shows a further arrangement to Figure 3 with an alternative arrangement of the transducers for determining the movement of the arm. Two rotary transducers are placed at the hinge points of the arm (as shown). Transducer 61 monitors the angle β which arm section 52 makes with the vertical. Transducer 62 monitors the angle α which arm section 52 makes with arm section 53. A third rotary transducer 63 is placed on the axis A-B to measure θ , the angle of orientation of the arm from a datum on the base.

The three angles α, β and θ can be used to find the co-ordinates of the position of the camera platform which are as follows :

$[(L_1 \sin \beta + L_2 \sin(\beta + \alpha)) \cdot \cos \theta ;$
 $[(L_1 \sin \beta + L_2 \sin(\beta + \alpha)) \cdot \sin \theta ;$
 $L_1 \cos \beta + L_2 \cos (\beta + \alpha)$

CLAIMS:

5 1. A camera mounting for a TV/video camera,
 comprising a base, a counter-balanced arm assembly
 (10) pivotally mounted on the base (11) at one end
 thereof to swivel about a vertical axis (A-B) and
10 having a platform (21) for carrying a camera at the
 other end thereof, the arm assembly having relatively
 movable components (16 to 20; 52 to 54) to permit,
 with said swivelling of the assembly about said
 vertical axis, movement of the platform in three
15 orthogonal axes; characterised in that the base (11)
 of the mounting has a datum point, the mounting has
 three separate transducer means for determining swivel
 movement of the arm about said vertical axis (A-B) and
 relative movement between said arm components in a
20 plane containing said vertical axis, and monitoring
 means are provided for determining, from the movements
 detected by said transducers, the position of the
 camera platform with respect to the datum point in
 said three axes to provide information regarding the
 location of the camera for purposes such as
25 controlling movement of a virtual reality image to be
 combined with a real image as seen by the camera as
 the camera is moved with respect to the datum.

30 2. A camera mounting as claimed in claim 1,
 wherein the arm assembly (10) is mounted on the base
 (11) for rotation about a vertical axis (A-B) through
 the datum point, the arm assembly providing movement
 of the camera platform in two orthogonal axes in any
 plane containing said vertical axis, and said
35 transducer means comprising first transducer means for
 determining rotation of the arm about said vertical
 axis and further transducer means for determining
 movement of the camera platform in said plane with

respect to the datum point.

5 3. A camera mounting as claimed in claim 2,
 wherein the arm assembly (10) is telescopic and is
 mounted on the base (10,12) to pivot (14) in a
 vertical plane about a horizontal axis (C).

10 4. A camera mounting as claimed in claim 2,
 wherein the arm assembly (10) comprises a first arm
 (52) pivotally mounted on the base (11) about a
 horizontal axis and a second arm (53) pivotally
15 mounted on the first arm about a parallel horizontal
 axis for supporting the camera platform (55).

20 5. A camera mounting as claimed in any of
 claims 2 to 4, wherein the arm assembly (10) has a
 control point (34, P) connected to the arm assembly so
 that movement of the control point with respect to the
 datum point in the vertical plane containing the arm
 and said vertical axis is directly proportional to the
 movement of the camera platform, and said further
 transducer means is arranged to monitor movement of
25 the control point with respect to the datum point.

30 6. A camera mounting as claimed in claim 5,
 wherein the transducer means for monitoring movement
 of the control point (34, P) comprise separate
 transducers for responding to movement of the control
 point with respect to the datum point in vertical and
 horizontal directions.

35 7. A camera mounting as claimed in claim 3,
 wherein the further transducer means are arranged to
 monitor extension of the arm and pivotal movement of
 the arm about said horizontal axis to monitor the
 position of the camera platform in a vertical plane

with respect to said datum.

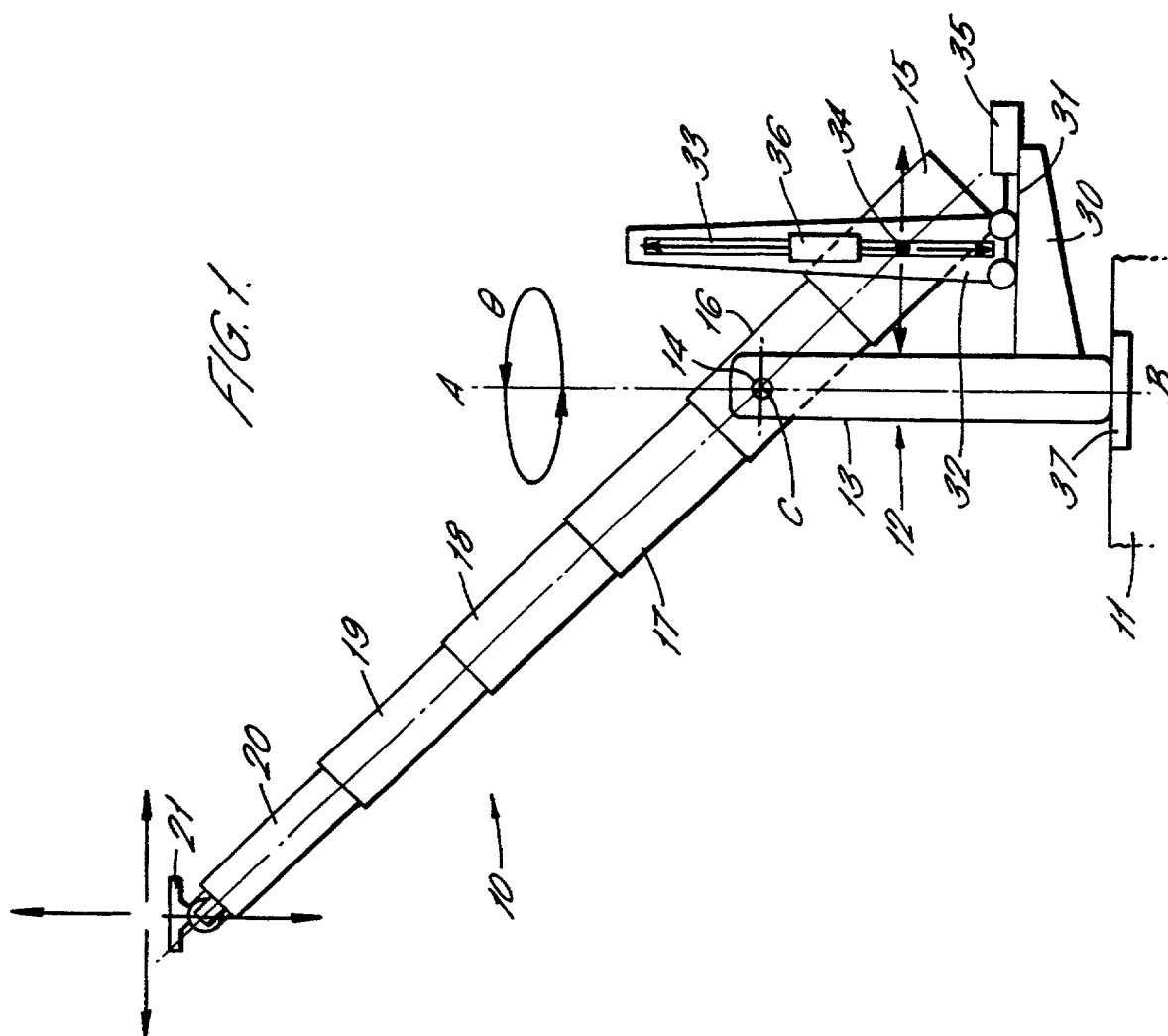
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8. A camera mounting as claimed in claim 4,
wherein said further transducer means are arranged to
monitor pivotal movement of the first arm about said
horizontal axis with respect to the base and pivotal
10 movement of the second arm with respect to the first
arm to monitor the position of the camera platform
with respect to said datum.

15

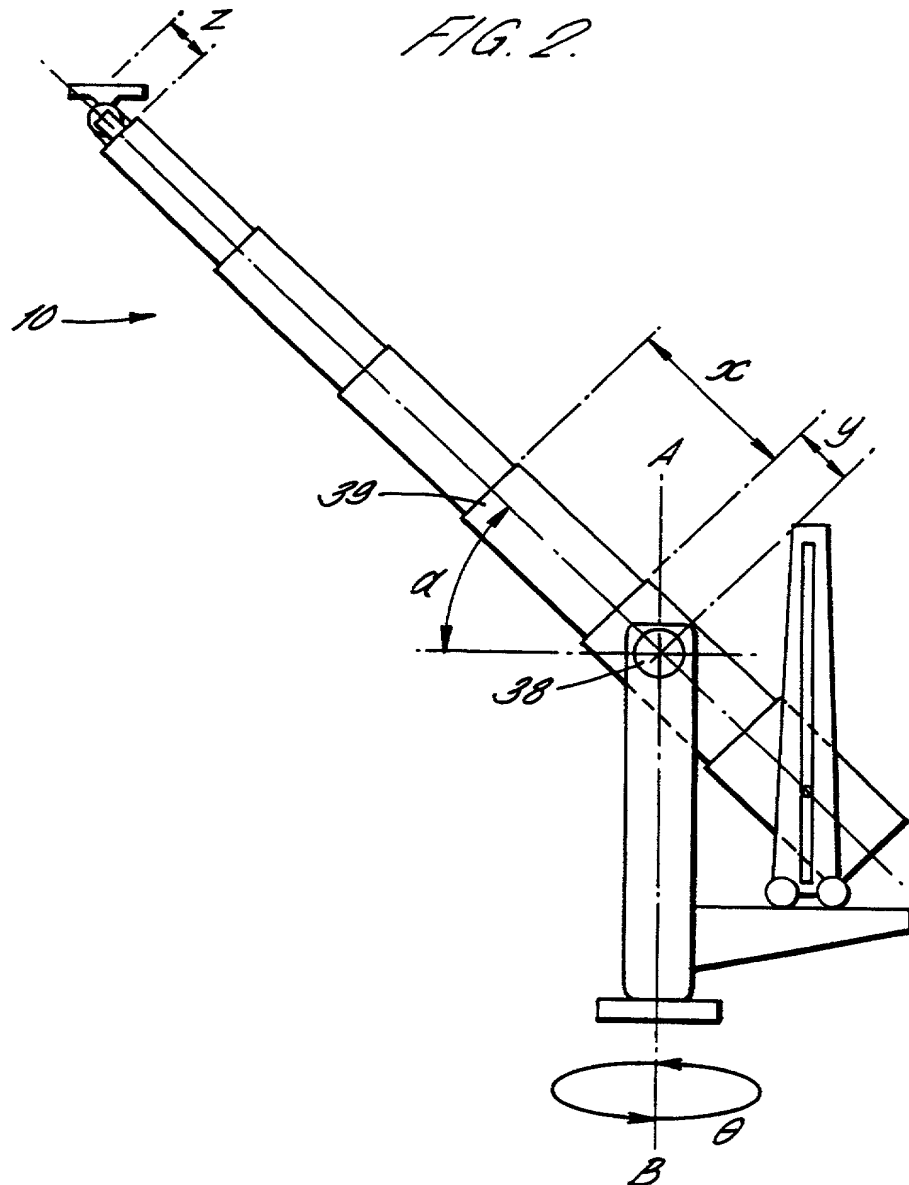
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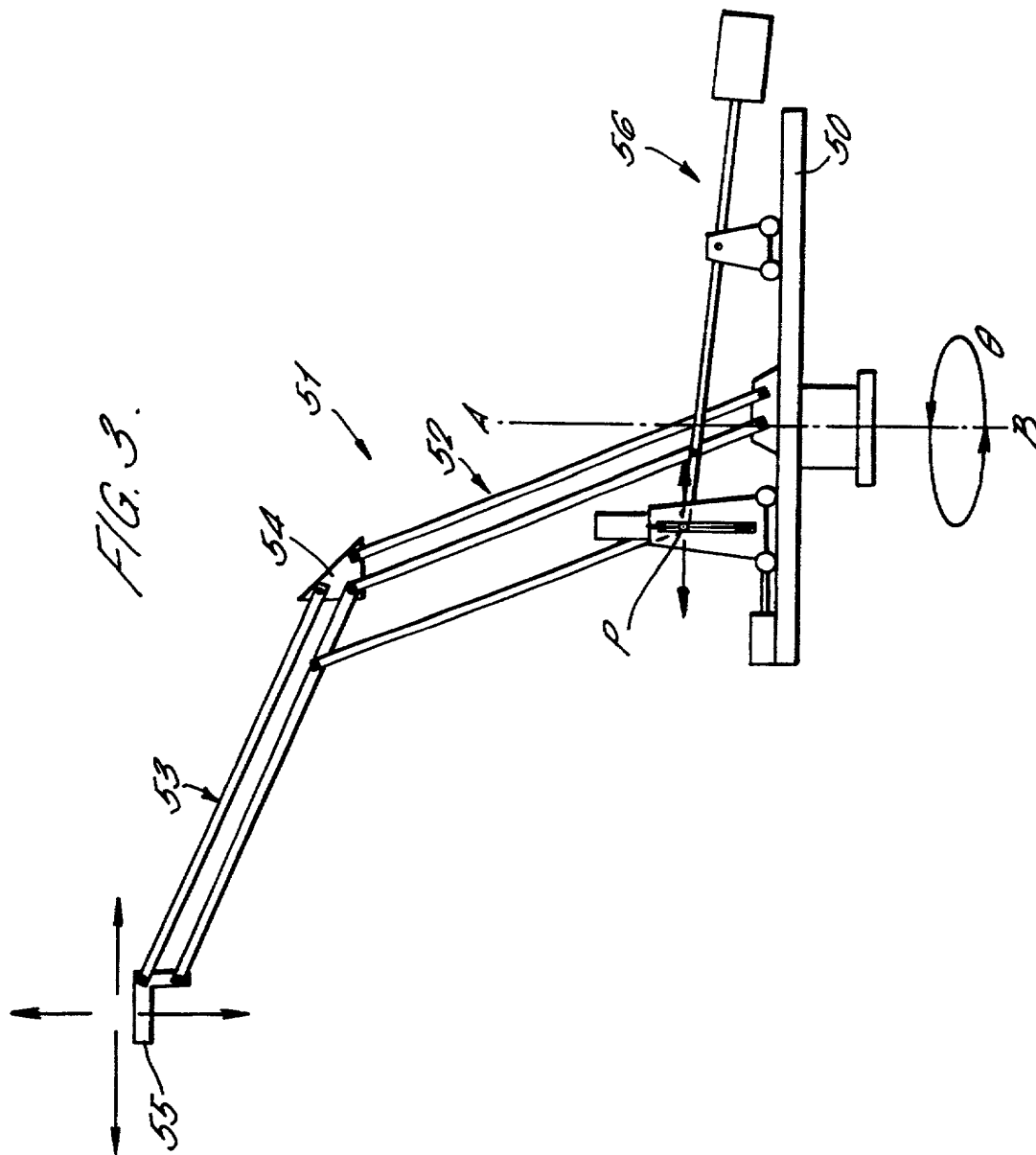


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FIG. 2.



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Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as

PCT Application Serial No. GB98/03520

and was amended on 24 JANUARY 2000

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

<u>9727258.7</u>	<u>G.B.</u>	<u>23/12/1997</u>
(Number)	(Country)	(Day/Month/Year Filed)
<u> </u>	<u> </u>	<u> </u>
(Number)	(Country)	(Day/Month/Year Filed)
<u> </u>	<u> </u>	<u> </u>
(Number)	(Country)	(Day/Month/Year Filed)

<input checked="" type="checkbox"/>	<input type="checkbox"/>
Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
Yes	No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

EL302699645US

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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Full name of second joint inventor, if any	
Second inventor's signature	Date
Residence	
Citizenship	
Post Office Address	

(Supply similar information and signature for third and subsequent joint inventors.)